2.5 Surveys and Mapping

2.5.1 *General*

The Design-Builder shall perform all Work necessary to complete the land surveying and survey mapping. This Work includes at a minimum, records of surveys, permits to destroy, and remove monuments, replacing or resetting monuments, land corner records, construction surveying, and all other land surveying services necessary to complete the Project.

2.5.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all Work related to this Section as referenced in TR Section 2.2, *Mandatory Standards*.

1. Special Provisions (Appendix 4)
2. Standard Specifications M 41-10 (Appendix 4)
3. WSDOT *Highway Surveying Manual* M 22-97 (Appendix 4)
4. WSDOT *Design Manual* M 22-01 (Appendix 4)
5. WSDOT *Plans Preparation Manual* M 22-31 (Appendix 4)
6. Standard Plans M 21-01(Appendix 4)

2.5.2.1 Reference Documents

WSDOT has provided mapping for the Project using Trimble S-6 Total Station and Trimble R-10 RTK. Primary survey horizontal and vertical controls were established by WSDOT Project Datum (as referenced in the WSDOT *Highway Surveying Manual*) based on a geographically appropriate Combined Factor (as referenced in the WSDOT *Highway Surveying Manual*) provided in Appendix 4 of this PDB Contract. Horizontal controls are based on the North American Datum of 1983/2011 and vertical controls are based on the North American Vertical Datum of 1988 and as specified as < 0.005M (± linear uncertainty).

WSDOT has provided an electronic digital terrain model (InRoads format) and 2D MicroStation.dgn files for all Culvert Sites comprised of topographic survey data in Project Datum coordinates converted from State Plane Coordinates (North of South Zone depending on location) using a combined factor for each Culvert Site as follows:

Map ID	WDFW Site ID	Stream Name and Tributary	Combined Factor [Note: Scale factors will be updated

			with RFP issuance]
1	990710	Unnamed Tributary to Hood Canal	
2	991612	Unnamed Tributary to Hood Canal	
3	996811	Unnamed Tributary to Hood Canal	
4	990395	Spring Creek to Hood Canal	
5	991240	Unnamed Tributary to Hood Canal	
6	991242	Unnamed Tributary to Kinman Creek	
7	996729	Unnamed Tributary to Grovers Creek	
8	992207	Carpenter Creek to Appletree Cove	
9	991744	Johnson Creek to Liberty Bay	
10	991999	NE Dogfish Creek	
11	991572	Unnamed Tributary to Dogfish Creek	
12	991241	SF Johnson Creek to Johnson Creek	
13	996804	Big Scandia Creek to Liberty Bay	
14	990235	Scandia	
15	15.02801.00	Scandia	
16	992008	Little Scandia Creek to Liberty Bay	
17	991000	Unnamed Tributary to Puget Sound	
18	15.02460.96	Strawberry Creek to Dyes Inlet	
19	994085	Hoot Creek to Barker Creek	
20	990024	Hoot Creek to Barker Creek	
21	930416	Unnamed to Hoot Creek	
22	994086	Hoot Creek to Barker Creek	
23	930408	Unnamed Tributary to Hoot Creek	
24	932143	unnamed to Hoot Cr	
25	932154	unnamed to Hoot Cr	
26	932155	unnamed to Hoot Cr	
27	935880	unnamed to Hoot Cr	
28	996748	Unnamed Tributary to Dyes Inlet	
29	996742	Unnamed Tributary to Dyes Inlet	

Existing WSDOT geodetic primary survey monumentation can be found at the following website: www.wsdot.wa.gov/monument

2.5.3 *Performance Requirements*

2.5.3.1 General

The Design-Builder is responsible for the accuracy of content and completeness of all survey information used in the design and construction of the Project.

The Design-Builder shall verify the location, accuracy, and datum of all survey data and survey information, regardless of the source.

2.5.3.2 Survey Manager

The Design-Builder shall designate a Survey Manager for the Project. The Survey Manager shall ensure all survey work is performed by or under the supervision of persons licensed to practice surveying in the State of Washington. The Survey Manager shall be the single point of contact for all survey activities.

2.5.4 *Design Requirements*

2.5.4.1 General

The Design-Builder shall prepare field survey ~~work~~work, so it meets the Technical Requirements of the PDB Contract and the Washington State Board of Registration for Engineers and Land Surveyors.

2.5.5 *Construction Requirements*

2.5.5.1 General

The Design-Builder shall maintain detailed survey records, including a description of the Work performed on each shift, and the methods and control points used. The survey records shall include the following:

- Adequate detail to allow the survey to be reproduced
- Graphic notes depicting control points used and relationship to other control points or reference points
- Description
- Coordinates
- Location description

Benchmarks and temporary benchmarks shall also have graphic notes depicting description, elevation, coordinates, and location. A data collector printout of the day's activities shall not be considered an acceptable record. When requested, the Survey Manager shall provide a copy of each day’s record to the WSDOT Engineer within 5 Calendar Days.

The Design-Builder shall provide staking and layout to adequately locate, construct, and check all types of construction work.

Upon request, the Design-Builder shall provide the WSDOT Engineer with copies of all calculations and staking data prior to staking.

2.5.5.2 Monumentation

2.5.5.2.1 General

Except for WSDOT geodetic primary control monuments, the Design-Builder shall document all WSDOT and governmental monumentation and property corners that will be modified, disturbed, or destroyed during the Term. The Design-Builder shall follow the procedures as set forth in Chapter 16 of the WSDOT *Highway Surveying Manual* relating to the destruction and replacement of monumentation. Consistent with Chapter 16 of the WSDOT *Highway Surveying Manual*, the Design-Builder shall reference or reset all existing General Land Office corner monuments that will be disturbed by construction activity.

2.5.5.2.2 WSDOT Monumentation

The Design-Builder shall note all WSDOT geodetic and highway alignment monuments found within the Project limits on a record of survey or monumentation map. The Design-Builder shall notify the WSDOT Engineer prior to any Work that may cause WSDOT geodetic or highway alignment monuments to be disturbed or destroyed. The WSDOT Engineer will determine the monuments to be replaced within 14 Calendar Days.

The Design-Builder shall complete all permits required by the Washington State Department of Natural Resources (DNR) and submit them to the WSDOT Engineer and shall allow 7 Calendar Days for Review and Comment. The Design-Builder shall submit and process forms to DNR, as required by DNR, for any WSDOT geodetic or highway alignment monuments that are disturbed, destroyed, or relocated. Before any survey monument is removed or disturbed, an approved DNR Application to Remove or Destroy a Survey Monument, together with an exhibit map of all found survey monuments, shall be provided to the WSDOT Engineer. Monuments removed or disturbed without an approved DNR Application to Remove or Destroy a Survey Monument and exhibit map will be replaced by WSDOT at the Design-Builder's cost, and any such costs shall constitute Unallowable Costs borne solely by the Design-Builder.

WSDOT will replace any WSDOT geodetic monument within the Project limits that may be disturbed or destroyed. The Design-Builder shall perpetuate all highway alignment monuments and ROW monuments disturbed or destroyed at an agreed-upon location unless written approval is obtained from the WSDOT Engineer. The Design-Builder shall label all monuments removed, replaced, or set on the post-construction record of survey described in this Section, and a copy shall be sent to DNR to complete the permit process.

The Design-Builder shall work with the WSDOT Engineer to determine the best location so that WSDOT may reset the geodetic monument.

Existing property corners within the Project limits that are verified by a recorded document shall be replaced at the intersection of the property line and the new ROW line.

2.5.6 *Submittals*

2.5.6.1 Survey Records and Submittals

The Design-Builder shall deliver an electronic file of the survey records to the WSDOT Engineer for each Culvert Bundle within 30 Calendar Days of the respective Culvert Bundle Substantial Completion.

2.5.6.2 Traffic Control Plan Submittal

The Design-Builder shall prepare a Maintenance of Traffic Plan whenever a survey crew, or a survey crew's vehicle, will be working within any roadway clear zone.

2.5.6.3 Monumentation Submittal

The Design-Builder shall submit the monumentation permits that are required for the removal, disturbance, and resetting of monuments to the WSDOT Engineer 14 Calendar Days prior to any removal, disturbance, or resetting to allow the WSDOT Engineer to monitor survey work to preserve monuments.

2.5.6.4 As-Builts

The Design-Builder shall produce reports documenting the location of all constructed elements. These include, at a minimum, the as-built alignments, profiles, drainage structures, Utilities, walls, bridges, and placement of the survey control monument. These reports shall include descriptive statements for the survey methods used to determine the as-built location of the feature being surveyed. Where WSDOT has provided data to the Design-Builder in x, y, z coordinate format, the Design-Builder shall provide the WSDOT Engineer with data in x, y, z coordinate format. Where WSDOT has provided data to the Design-Builder in x, y coordinate format only, or z coordinate format only, the Design-Builder shall provide the WSDOT Engineer with data in x, y coordinate format only, or z coordinate format only.

All x, y, and z coordinates shall be in Project Datum corresponding to that culvert crossing.

The Design-Builder shall provide the WSDOT Engineer with an as-built survey basemap file in Project Datum corresponding to that culvert crossing.

The Design-Builder shall deliver all as-built survey files to the WSDOT Engineer for the Culvert Bundle within 30 Calendar Days of Culvert Bundle Substantial Completion of each Culvert Bundle.

2.5.6.5 Post-Construction Record of Survey

The Design-Builder shall provide the WSDOT Engineer with an electronic file of the post-construction record of survey (as referenced in the WSDOT *Highway Surveying Manual*). A draft copy shall be submitted to the WSDOT Engineer for Review and Comment 14 Calendar Days prior to recording with the county where the survey was performed. A conformed copy that includes the county's recording numbers and an electronic file shall be delivered at the time of Culvert Bundle Substantial Completion of each Culvert Bundle. The electronic format shall be compatible with WSDOT's format. The post-construction record of survey shall include, but is not limited to, the following:

- All monuments that have been removed by construction activities, with an indicator showing if they have been replaced or not.
- All permanent secondary and tertiary horizontal and vertical control points established by the Design-Builder in Project Datum (x, y, and z), and by station and offset to the ROW centerline alignment.
- Report of survey mark data sheets (Appendix 4) for all permanent control points.
- All monuments, remaining undisturbed and set during the Term, defined by station, and offset to the ROW centerline alignment.

2.5.6.6 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related submittals that do not fit in the previous categories but are prepared in accordance with this Section.

End of Section